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Initial stages of growth of pentacene on graphene[1] GVIDO BRATINA, MANISHA CHIKKARA, EGON PAVLICA, University of Nova Gorica, Nova Gorica, Slovenia, ALEKSANDAR MATKOVIC, ANGELA BELTAOŠ, DJORDJE JOVANOVIC, DANKA STOJANOVIC, RADOŠ GAJIC, Institute of Physics, University of Belgrade, Serbia — We have examined by scanning probe microscope submonolayer coverages of pentacene on graphene fabricated by chemical vapor deposition (CVD) and exfoliated graphene. Inherent to CVD-graphene, even upon transferring onto SiO_2 substrates is the presence of varying surface density of folds-grafolds. By means of Kelvin force microscopy we observe about 0.3 eV higher workfunction on multiply-folded grafolds, but within our resolution, observe no change in workfunction for singly folded grafolds. By atomic force microscopy we observe that grafolds act as nucleation centers for pentacene, inducing three-dimensional (3D) morphology of pentacene layers in the nucleation phase of growth. Moreover, the resulting elongated islands exhibit a preferential orientation perpendicular to the dominant direction of a grafold. We associate this behavior in terms of elastic strain and enhanced chemical reactivity of the grafolds. This type of morphology is at strong variance with the morphology of pentacene layers that we observe on exfoliated graphene. There we observe two-dimensional (2D) islands whose height of 1.5 nm corresponds to a thin-film phase of pentacene. We observe the onset of 3D island nucleation on the surface of the 2D islands that have attained a critical size. We interpret this behavior in terms of surface energy of pentacene that depends on the underlying substrate.

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